RESEARCH INTERESTS

Professional Goal:

- To be an experimental high energy physicist in a challenging post-doc position implied in data analysis and detector development.

Physics Profile:

My research interests are in experimental particle physics: experimental investigation of the fundamental constituents of matter and their interactions using high-energy accelerators and powerful and large detectors based on advanced technology. Particle physics seems to be the most elegant and tangible description of how physics operates at the smallest scales. Our current understanding is expressed in the Standard Model (SM) of particle physics a theory of the strong, electromagnetic and weak interactions. This theory has been tested to very high accuracy with great success and explains almost all observed experimental facts. However, the SM is not expected to be a complete theory. For example, it doesn't explain the number of fermion families or their mass hierarchy. It also doesn't provide a unified description of all gauge symmetries. Compositeness models postulate constituents of the SM fermions and new strong dynamics that bind these constituents.

We search for quark compositeness by measuring dijet mass differential cross section in a few regions of rapidity ($|y|$) using about 3 fb^{-1} of data collected by the CDF experiment. The signal is expected in the region with small $|y|$. **Abstract accepted to APS 2009, Denver**.

We also studied CMS sensitivity to quark contact interactions in the dijet final state using the CMS software framework for simulation and reconstruction (CMSSW). We found that for an integrated luminosity of 10 pb^{-1}, 100 pb^{-1}, 1 fb^{-1}, and 10 fb^{-1} CMS can expect to exclude at 95% CL a Λ value of $3.67, 6.461, 11.51,$ and 14.31 TeV or discover at 5σ significance a Λ value of $2.69, 4.703, 8.694,$ and 12.81 TeV, respectively. **Published in J.Phys.G36:015004,2009**.

Study of direct photon production in high energy hadronic collisions provides a clean tool for testing the essential validity of perturbative QCD predictions as well as for constraining the gluon distributions of the hadrons. This motivated us to study in detail the characteristics of single direct photon production in the kinematical regions accessible at the LHC regime. We also studied parton kT smearing effects in direct photon production at Tevatron centre of mass energy using CDF and D Run1 data.

Published in Phys. Rev. D., 67, 014016, Jan. 2003 and Phys. Rev. D., 68, 014017, July 2003.

Silicon Sensors Development:

The application of Si detectors in the high-energy physics experiments requires a reliable performance in adverse radiation conditions, which is the main test for these detectors. Devices requiring high voltages face the problem of high peak electric field in the vicinity of junction termination. Various contours and design principles have evolved in the effort to reduce these peak fields. Out of many proposed solutions, metal-overhang and guard ring techniques are of general interest for improving the breakdown performance of the Si detectors. Our study demonstrates the superiority of metal-overhang technique over field-limiting ring technique for planar shallow-junction high-voltage Si detectors used in high-energy physics experiments. **Published in Solid State Electronics 48, 1587 (2004)**. We also performed the simulations to analyze electrical parameters for the most deleterious long-term effect of radiation: the change in effecctive charge carrier concentration and resulting increase in full depletion bias. The systematic studies of the electric field to get an insight into the device behavior provide, for the first time, a possible explanation for the improvement in breakdown performance with radiation. **Pubished in Eur. Phys. J. AP. 24, 171(2003)**.